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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/632,910	08/04/2000	Kohei Tatsumi	52433/609	1969

26646 7590 05/21/2003

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NEW YORK, NY 10004

EXAMINER

CHAMBLISS, ALONZO

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/632,910

Applicant(s)

TATSUMI ET AL.

Examiner

Alonzo Chambliss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 16-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/254,119.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 13.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/8/03 in Paper No. 15 has been entered.

***Response to Arguments***

2. Applicant's arguments filed 5/8/03 in Paper No. 15 have been fully considered but they are not persuasive.

Applicant alleges that Juskey nor Okuyama both fail to disclose balls of the order of .1 millimeter. This argument is respectfully deemed to be unpersuasive because none of the claims recite that the solder balls have to be in the order of .1 millimeter.

Applicant alleges that Okuyama fails to disclose solder balls that can be mounted together on the wafer at a number of the order of several hundred thousands. Thus, the present invention is superior in productivity to Okuyama. This argument is respectfully deemed to be unpersuasive because none of the claims recite that the solder balls have to be mounted together on the wafer at a number of the order of several hundred thousands.

Applicant alleges that Juskey fails to disclose a device chip with solder balls fixed (adhesive bonded) to its electrodes through a flux, and does not have bumps resulting from the reflowing of the bump material. This argument is respectfully deemed to be unpersuasive because claims 20 and 21 both recite that the bumps reflowed. Furthermore, none of the claims recite that the chip does not have bumps resulting from the reflowing of the bump material.

Applicant alleges that Juskey does not disclose use a flux. This argument is respectfully deemed to be unpersuasive because on page 6 last paragraph of applicant's remarks attached with the filing of the RCE that **a flux is also used in Juskey. The flux is for the bonding of the chip to the substrate using the bumps provided on the chip, and is applied to the electrodes of the substrate.** Furthermore, Juskey disclose using a flux 26 to aid in attaching a chip to a substrate (see Figs. 3 and 4).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of

the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a). 5. Claims 16-18, 20-22, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey, Jr. et al. (U.S. 4,940,181).

4. With respect to Claims 16, 17, and 20-22, Juskey discloses electrodes 18, 20, 22 formed on a chip carrier substrate 10 (see Figs. 1-3). Juskey discloses that the solder bumps can be used with chip carrier or other member that is well known in the art (see col. 1 lines 13-17). Therefore, it would have been obvious to substitute the semiconductor chip in replace of the carrier substrate, since a semiconductor chip is formed from a wafer substrate that has been sliced into individual chips. Furthermore, one skilled in the art would readily recognize from Juskey that a flip chip bonding procedure takes place, since flip chip bonding incorporates placing solder balls on a chip and then flipping the chip to a substrate to yield a final product that is seen in Figs. 3 and 4. Each bump 30 consists of a spherically formed metal ball having a given size, and adhesive bonded to the electrodes 18, 20, and 22 for the attachment of the bumps 30. Each electrode 18 includes a layer of an electrode material 20 and at least one layer 22 laminated to the layer of the electrode material 20 to avoid deterioration (i.e.

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strengthen and protect) bonding such that the at least one layer 22 has a peripheral dimensions substantially the same as those of the electrode material 20. The metal balls 30 are adhesively bonded to the respective electrodes with a flux 26. The at least one layer 22 has a thickness (i.e. .04 mils) smaller than the electrode material 20 thickness (i.e. .15 mils). The metal balls 30 are reflowed (see col. 2 lines 35-60 and col. 3 lines 33-39; Figs. 2-4).

With respect to Claims 18, applying the flux 26 to the electrodes 18, 20, 22 (see Fig. 3; Col. 3 lines 26-34).

With respect to Claims 25 and 26, the bumps 30 consisting of metal balls are adhesively bonded to the respective electrodes 18, 20, 22 on the semiconductor substrate 10 (i.e. semiconductor chip) (see col. 3 lines 26-40; Fig. 4). 6. Claims 19, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey, Jr. et al. as applied to claims 16 and 20 above, and further in view of Okuyama (JP 4-65130).

Juskey fails to disclose wherein the metal balls are adhesive bonded to the electrodes by a process comprising the steps of applying vibration at a small amplitude to a vessel containing the metal balls to cause the metal balls to jump up. Arranging and holding the metal balls on an arrangement base plate by attracting the jumping up metal balls to attraction openings provided in the arrangement base plate in positions corresponding to the electrodes of the semiconductor chip to which the metal balls are to be adhesive bonded. Removing excess metal balls adhering either to the arrangement base plate or to the metal balls attracted to the attraction openings and

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simultaneously contacting the metal balls held and arranged on the arrangement base plate with the electrodes of the semiconductor chip. However, with respect to Claims 19 and 23, Okuyama discloses wherein the metal balls 8 are adhesive bonded to the electrodes 6 by a process comprising the steps of applying vibration at a small amplitude to a vessel containing the metal balls 8 to cause the metal balls 8 to jump up. Arranging and holding the metal balls 8 on an arrangement base plate 29 by attracting the jumping up metal balls 8 to attraction openings 31 provided in the arrangement base plate 29 in positions corresponding to the electrodes 6 of the semiconductor chip 2 to which the metal balls 8 are to be adhesive bonded. Removing excess metal balls 8 adhering either to the arrangement base plate 29 or to the metal balls 8 attracted to the attraction openings 31 and simultaneously contacting the metal balls 8 held and arranged on the arrangement base plate 29 with the electrodes 6 of the semiconductor chip 2 (see English abstract and all of the figures). Therefore, it would have been obvious to use vacuum device with Juskey, since the vacuum device would automatically form high density solder bumps and simultaneously mount a plurality of solder bumps on electrode pads of the chip as taught by Okuyama.

The prior art made of record and not relied upon is cited primarily to show the process of the instant invention.

### ***Conclusion***

5. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703)

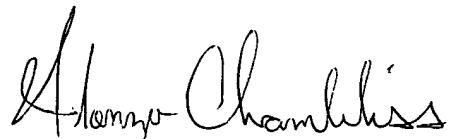
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306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

AC/May 16, 2003

A handwritten signature in black ink, appearing to read "Alonzo Chambliss". The signature is fluid and cursive, with the first name "Alonzo" and last name "Chambliss" clearly distinguishable.

Alonzo Chambliss  
Patent Examiner  
Art Unit 2827